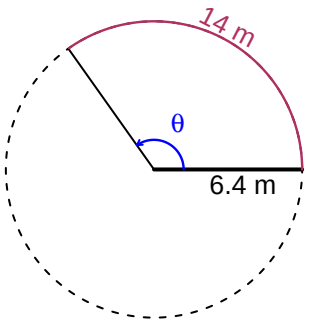
Name: Date:

Trig Final (SLTN v605)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 6.4 meters. The arc length is 14 meters. What is the angle measure in radians?

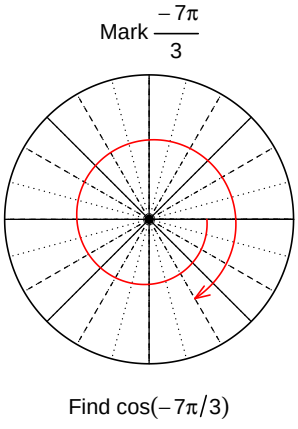


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

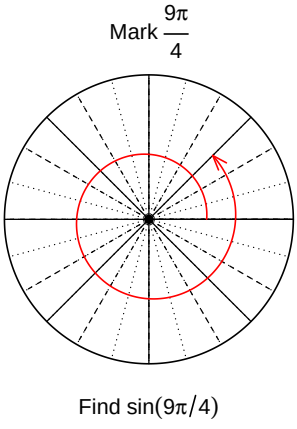
$\theta = 2.188$ radians.

Question 2

Consider angles $\frac{-7\pi}{3}$ and $\frac{9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{-7\pi}{3}\right)$ and $\sin\left(\frac{9\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\cos(-7\pi/3)$



Find $\sin(9\pi/4)$

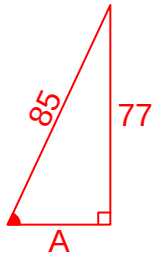
$\cos(-7\pi/3) = \frac{1}{2}$

$\sin(9\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\sin(\theta) = \frac{77}{85}$, and θ is in quadrant II, determine an exact value for $\tan(\theta)$.

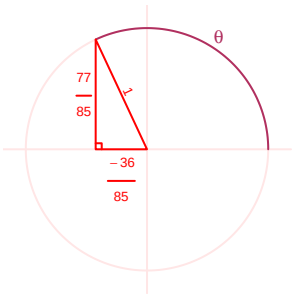
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$A^2 + 77^2 = 85^2$$
$$A = \sqrt{85^2 - 77^2}$$
$$A = 36$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\tan(\theta) = \frac{\frac{77}{85}}{\frac{-36}{85}} = \frac{-77}{36}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 7.66 meters, a midline at $y = 2.13$ meters, and a frequency of 3.66 Hz. At $t = 0$, the mass is at the maximum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 7.66\cos(2\pi 3.66t) + 2.13$$

or

$$y = 7.66\cos(7.32\pi t) + 2.13$$

or

$$y = 7.66\cos(23t) + 2.13$$